

# Risk Control

Recommendations for hazard classification of heating appliances



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## ➤ SCOPE

This classification system applies to equipment providing heating in industrial, commercial and some residential properties. It does not apply to single domestic dwellings and relates only to space heaters and not to water heaters or other forms of heating equipment.

## ➤ SYNOPSIS

These recommendations outline the insurers' classification of heaters employing solid materials, electricity, oil, gas and geothermal sources of fuel. A dedicated section addresses central heating systems.

The document applies to portable, transportable and fixed space heating appliances.

## ➤ DEFINITIONS

### **Biomass:**

Biological material derived from living, or recently living organisms, most commonly plant or plant-derived material.

### **Central heating system:**

Where the heated medium is delivered to the space(s) to be heated via pipes or ducts, usually from a single heating source.

### **Direct fired system:**

Direct fired systems do not incorporate a heat exchanger thus any products of combustion may enter the heated space.

### **Fan failure cut-out device:**

A device fitted to electrical, gas or oil heaters, which is designed automatically to shut down a forced convection heater in the event of air movement failure.

### **Fire valve:**

An automatically-operated fast-acting valve to shut off the supply of gas or oil to a heater in the event of fire.

### **Flame failure device:**

A device fitted to a gas or oil-fired heater which is designed to automatically shut off the fuel supply in the event of flame failure.

### **Forced convection heater:**

A heater which supplies heated air to the space or spaces to be heated by means of an air-moving device such as a fan.

### **Gas:**

Gaseous fuel, including natural gas and liquefied petroleum gas (LPG).

### **Geothermal heating:**

In the context of this document, this term relates generically to the recovery of heat from the earth or the atmosphere.

### **Indirect fired system:**

A system incorporating a heat exchanger, where any products of combustion are exhausted to the open air and do not enter the heated space.

### **Overheat cut-out device:**

A preset and sealed temperature-actuated device (other than a fire valve) fitted to electrical, gas or oil heaters, which is designed to automatically shut down the heater in the event of overheating resulting from, for example, failure of the normal method of temperature control.

### **Portable or transportable heater:**

A heater which is not securely fixed in a permanent position.

### **Remote fuel source:**

Where gas or oil is fed to the heater through fixed, rigid pipework from either an external gas supply or oil tanks located as specified in RC9: **Recommendations for oil fired installations** (ref 1).

### **Segregated system:**

Where the heater is segregated from the rest of the building by elements of construction providing not less than two hours' fire resistance (including self-closing doors where appropriate) in accordance with the FPA Design Guide (ref 2).

### **Waste fuel:**

Fuels that could be regarded as waste or by-products of processes and include waste oil, wood (including sawdust), straw and other combustible waste materials.

### **Waste oil:**

Used oil, such as motor engine and gearbox oils, transmission fluids, hydraulic oils, metalworking oils such as cutting and grinding oils, and vegetable and cooking oils.

## ➤ INTRODUCTION

For the convenience of property insurers, space heaters are classified into six classes: A,B,C,D,E and F, corresponding to their relative fire hazard, where A represents the least overall hazard and F the greatest overall hazard. Heaters in Class F will give rise to special consideration and certain types of heater may be undesirable in particular circumstances.

Architects and others concerned with the design and installation of heating systems are recommended to consider the installation of heating that minimises the fire hazard in the premises. Where difficulties arise, they should seek advice from insurers at the planning stage.

## ➤ RECOMMENDATIONS

### **1. Compliance with fire safety legislation**

1.1 Heating systems in all commercial and industrial premises should be considered at the time of the fire risk assessment undertaken for the business in compliance with the Regulatory Reform (Fire Safety) Order 2005 (or the equivalent legislation in Scotland and Northern Ireland) (refs 3-7).

1.2 Where appropriate, an assessment in compliance with the **Dangerous Substances and Explosive Atmospheres Regulations 2002** (DSEAR) (ref 8) should be undertaken to ensure that the form of heating is suitable for the area concerned or that heaters are located away from any hazard zones identified in the assessment in relation to flammable liquids, gases and dusts that may be stored or in use on the premises.

1.3 The response by fire and rescue services to 999/112 calls and signals routed via fire alarm monitoring organisations varies widely throughout the UK, and differs from day to night time. Fire safety managers should refer to the relevant fire and rescue service websites to make themselves aware of the levels of response in the areas in which their premises are located and consider this information when undertaking and reviewing fire risk assessments.

## 2. Business continuity

- 2.1 A faulty heater or a small fire can have a disproportionate effect on a business if occurring in a critical area. Heating is a critical element of staff welfare in most businesses and in other cases temperature control may need to be exercised to maintain the properties of chemicals, raw materials or final products. It is therefore important that an appropriate heating system is selected at the design stage and is carefully maintained thereafter to ensure effective business operations.
- 2.2 All organisations should take steps to ensure the continued smooth running of their business by making a suitable emergency plan. Guidance for this is set out in *Business Resilience: A guide to protecting your business and its people* (ref 9). The emergency plan should address the implications of a fire, flood or other perceived disaster on all facets of the business model. It should indicate the lines of communication that should be followed and the contact details for specialist assistance, providers of alternative accommodation and suppliers of manufacturing plant or services.
- 2.3 When complete, the emergency plan should be rehearsed periodically by means of a table top exercise, with the results being assessed and amendments made to the plan as necessary.
- 2.4 Consideration may be given to applying commercially available computer programmes, such as the **ROBUST** software (**Resilient Business Software Toolkit**) that is available free of charge (ref 10), or other appropriate product, to develop and check the adequacy of the plan.

## 3. Fire safety management

- 3.1 Heaters should be used only with the type(s) of fuel for which they are designed.
- 3.2 All heaters should be used, maintained and serviced in compliance with the manufacturers' instructions.
- 3.3 Electrical heaters not fitted with a 13 amp plug must be installed by a competent electrician (such as those recognised by the NICEIC, the Electrical Contractors' Association (ECA), the National Association of Professional Inspectors and testers (NAPIT) or Select in Scotland).
- 3.4 The wiring and other elements of electrical installations in the premises should be tested periodically by a competent electrician and in accordance with the current edition of BS 7671 (the IET Wiring Regulations) (ref 11). Inspections should be carried out on a risk assessed basis as recommended in the Periodic Inspection Report.
- 3.5 Where a portable heater is in use (ie one fitted with a 13 amp plug), it should be inspected periodically (PAT tested) at least in accordance with HS(G)107 (ref 12) and the IET Code of Practice for In-service Inspection and Testing of Electrical Equipment (ref 13) and may need to be tested more often as determined by a risk assessment.
- 3.6 Gas heaters should be installed, serviced and maintained in accordance with the manufacturer's instructions by a Gas Safe registered engineer. Periodic inspections should be undertaken in accordance with the requirements of the Gas Safety (Installation and Use) Regulations 1998 (ref 14).

- 3.7 Oil-fired boilers should be serviced at least annually in accordance with the manufacturer's requirements by an OFTEC Registered Technician.
- 3.8 Where the heater burns fuel of an unconventional nature, for example waste oil, special consideration will be required. The most acceptable systems are those with segregated heaters; the manufacturer's instructions should be followed at all times. Further information regarding heating systems fuelled by waste oil are outlined in RC4 (ref 15).
- 3.9 Solid fuel appliances should be serviced and maintained by a competent engineer in accordance with the manufacturer's requirements.
- 3.10 When not in use, portable heaters should be stored in a low fire risk area. Gas cylinders should be removed and stored securely outside the premises as described in RC8 (ref 20). Where heaters utilise a liquid fuel, tanks should be emptied and the fuel stored in compliance with RC4 (ref 15).
- 3.11 No combustible material should be situated within 1m of a space heater or boiler. The area to be kept clear should be identified by barriers and/or prominent floor markings.
- Where there is a dedicated boiler room this should not be used for the storage of combustible materials or the drying of clothes.
- 3.12 All air circulation ducts, grilles and lagging components that form part of the heating system should be of non-combustible construction.
- 3.13 The installation of flues should be in accordance with the requirements of Approved Document J to the Building Regulations 2000 (ref 16).
- 3.14 Flues should be as short as practicable, they should preferably pass directly to the open and should not pass through, or be contained within, floor or ceiling voids, or roof spaces where exposed combustible materials are present. Flues should be vertical and changes in direction should be avoided wherever possible; flues should not pass through fire compartment walls.
- 3.15 In those cases where it is not possible to install the flue as indicated in paragraph 3.13, it should be enclosed in a service shaft of non-combustible construction having a fire resistance of at least 30 minutes and with sufficient access points to facilitate cleaning of the flue throughout its length.
- 3.16 Where a flue penetrates a combustible element of a roof or ceiling the following should be considered:
- an insulating and non-combustible collar fitted around the pipe with a minimum thickness of 40mm;
  - a proprietary sleeve system installed around the pipe with at least 60-minutes' fire resistance in terms of insulation and integrity; or
  - the combustible material being cut back leaving a space of at least 150mm around the flue pipe.
- N.B. In the case of wood burning stoves, insulated flue linings should be used in all cases where flues pass through or close to combustible materials. Further information is set out in RC 4 (ref 15).*
- 3.17 The use of single-walled flues should be avoided. Even where double-skin flues are used, a clear space of at



Figure 1: Examples of double skin insulated flues

least 1m from combustible materials should be maintained around the flue pipes within the building.

- 3.18 All parts of a flue pipe should be accessible to allow regular cleaning to prevent the build-up of tar, soot and other deposits. The frequency of cleaning will depend upon the rate of build-up of the deposits, which should be monitored. In general, cleaning should be in line with the manufacturer's instructions or more frequently as determined by a risk assessment of the flues.
- 3.19 Chimneys should be carried to such height and position as will ensure freedom from downdraught. They should be substantial and constructed of non-combustible material capable of withstanding the environmental conditions and the gas temperatures to which they may be subjected. There should be suitable access for cleaning the whole length of the flue.
- 3.20 Consideration should also be given to the provision of spark arrestors in chimneys in appropriate circumstances.
- 3.21 Each item of oil-burning equipment should preferably have

a separate flue and, in any event, flues from oil-burning equipment should not be connected to the same chimney as flues from heaters burning solid fuel.

- 3.22 Portable heaters should be use in accordance with RC15: **Recommendations for the use of portable and transportable heaters in commercial and industrial premises** (ref 17).

- 3.23 Any method of heating for use in potentially flammable and/or explosive atmospheres will require special consideration following a risk assessment of the area in accordance with the DSEAR Regulations (ref 8).

#### 4. Fire protection

- 4.1 A suitable number of appropriate portable fire extinguishers should be available in the immediate vicinity of boilers and other heating appliances and these should be immediately accessible in the case of a fire. Portable extinguishers should be approved and certificated by an independent, third party certification body and be installed in accordance with BS 5306-8 (ref 18) and inspected and maintained in compliance with BS 5306-3 (ref 19).
- 4.2 Extinguishers should be prominently signed. A weekly inspection of all fire points should be carried out, to ensure that extinguishers are in place, undamaged and readily accessible.

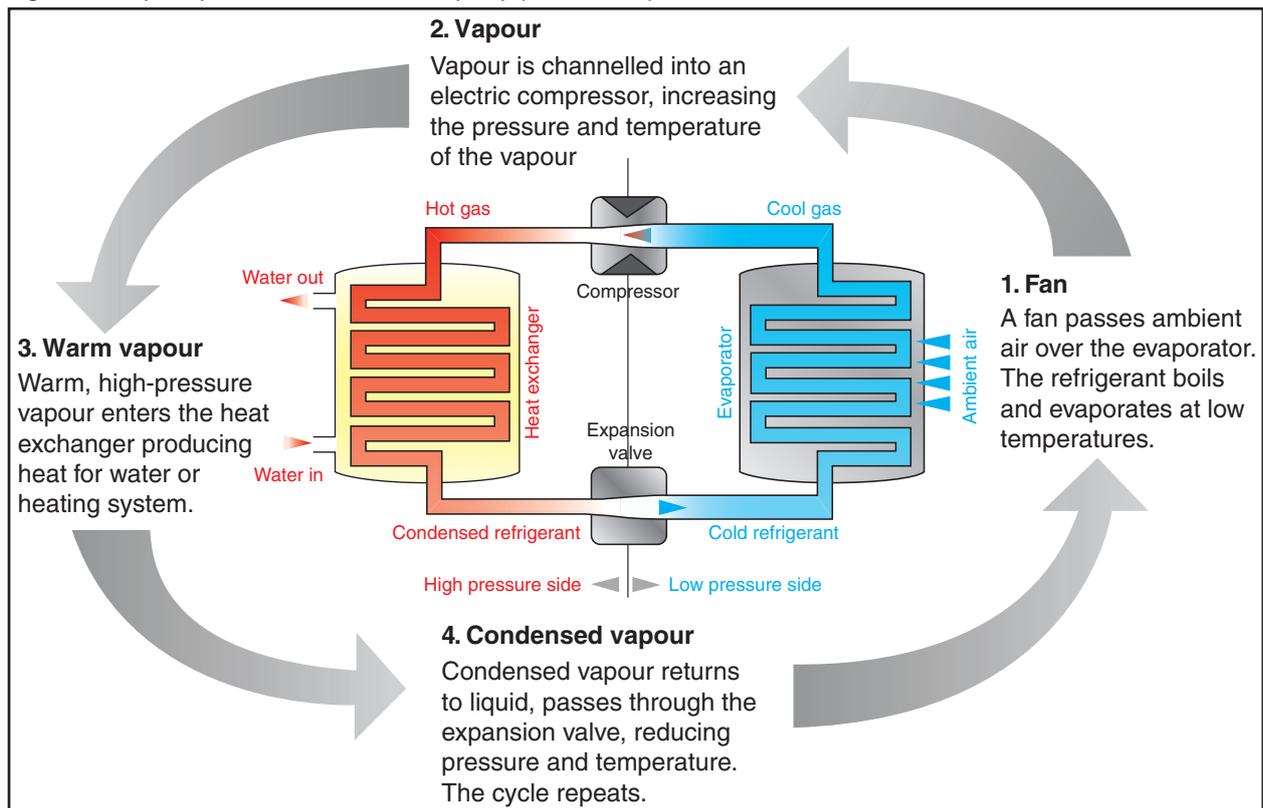
### CLASSIFICATION

#### 5. Central heating systems

For central heating systems, the heater should incorporate, where applicable:

- I. a remote fuel source and
- II. a flame failure device, an overheat cutout device, a fan failure cut-out device and a fire valve.

Figure 2: The principles of an air source heat pump (section 6.3.1)



Systems incorporating only (I) or (II) should be downgraded by one class as set out in Table 5.

Systems incorporating neither (I) nor (II) should be downgraded by two classes as set out in Table 5.

	Form of heater	Class
<b>5</b>	<b>Central heating systems</b>	
<b>5.1</b>	<b>Segregated central heating systems</b>	
<b>5.1.1</b>	<b>Indirect fired systems</b> <ul style="list-style-type: none"> <li>- Where hot water or steam enters a system of pipes at a temperature not exceeding 120°C</li> <li>- Where hot water or steam enters a system of pipes at a temperature which exceeds 120°C</li> <li>- Where heated air reaches the space(s) to be heated via a system of ducts or voids built into the structure for this purpose.</li> </ul>	A  B  A
<b>5.1.2</b>	<b>Direct fired systems</b> that do not incorporate a heat exchanger, where any products of combustion enter the heated space.  <ul style="list-style-type: none"> <li>- Heated by electricity</li> <li>- Fired by gas or oil</li> </ul>	B  C

<b>5.2</b>	<b>Non-segregated central heating systems</b>	<b>Class</b>
<b>5.2.1</b>	<b>Indirect fired systems</b>  <ul style="list-style-type: none"> <li>- Heated by electricity</li> <li>- Fired by gas, oil or solid fuel</li> </ul>	B  C
<b>5.2.2</b>	<b>Direct fired systems</b>  These are classified under sections 7 to 10	

#### 6. Geothermal heating systems

	Form of heater	Class
<b>6</b>	<b>Geothermal heating systems</b>	
<b>6.1.1</b>	Air source heat pumps	A
<b>6.1.2</b>	Ground source heat pumps	A

#### 7. Electrical appliances

Note should be taken regarding sections 3.3 to 3.5 above.

	Form of heater	Class	
		Fixed	Portable/ Transportable
<b>7</b>	<b>Electrical appliances</b> (Excluding those covered by section 5)		
<b>7.1</b>	Electric underfloor or ceiling heating with heating elements totally embedded in cement or concrete	A	
<b>7.2</b>	<b>Heaters with enclosed elements</b> eg fluid filled radiators and tubular heaters:		
<b>7.2.1</b>	- Incorporating an overheat cutout device	B	C
<b>7.2.2</b>	- Other than in 7.2.1	C	D
<b>7.3</b>	<b>Forced convection heaters</b> , eg fan heaters:		
<b>7.3.1</b>	- Incorporating a fan failure cutout device and/or overheat cutout device	B	C
<b>7.3.2</b>	- Other than in 7.3.1	C	D
<b>7.4</b>	<b>Thermal storage heaters:</b>		
<b>7.4.1</b>	- Incorporating an overheat cutout device	C	
<b>7.4.2</b>	- Other than in 7.4.1	D	
<b>7.5</b>	<b>Heaters with exposed elements or elements sheathed in ceramic, silica or metal</b>	D	E

### 8. Gas and oil fuelled appliances

The classification as shown in the table below refers to gas heaters fuelled by either a mains gas supply or gas cylinders. Where gas cylinders are in use, the storage and use of these should be in compliance with RC8 (ref 20). Where oil fuelled appliances are in use, they should be installed and used in accordance with the manufacturers' instructions. In the case of heaters utilising waste oil, the Recommendations set out in RC4 (ref 15) should be followed.

	Form of heater	Class	
		Fixed	Portable/ transportable
<b>8</b>	<b>Gas appliances and oil fuelled appliances (Including catalytic heaters but excluding heaters covered by section 5)</b>		
<b>8.1</b>	Appliances having both:		
<b>8.1.1</b>	- a remote fuel source, and		
<b>8.1.2</b>	- a flame failure device, an overheat cutout device, a fire valve and, where relevant, a fan failure cutout device	<b>C</b>	<b>D</b>
<b>8.2</b>	Appliances complying with either 8.1.1 or 8.1.2	<b>D</b>	<b>E</b>
<b>8.3</b>	Other than in 8.1 or 8.2.	<b>E</b>	<b>F</b>

### 9. Solid fuel appliances

The table below refers to appliances burning solid fuels, including carbonaceous fuels, biomass, wood and proprietary pellets generated from recycled materials.

	Form of heater	Class	
		Fixed	Portable/ Transportable
<b>9</b>	<b>Solid fuel appliances (Excluding those covered by section 5)</b>		
<b>9.1</b>	Fireplaces and heaters (other than braziers) on a floor or base of concrete or brick not less than 125 mm thick and of adequate area	<b>D</b>	
<b>9.2</b>	Other than in 9.1	<b>F</b>	<b>F</b>
<b>9.3</b>	<b>Biomass heaters</b>		
<b>9.3.1</b>	Incorporating an Auger feedstock transport system protected by an automatic fire suppression installation.	<b>C</b>	
<b>9.3.2</b>	Other than in 9.3.1	<b>D</b>	

### 10. Miscellaneous heating systems

The classification of miscellaneous heating systems is set out in the table below.

	Form of heater	Class	
		Fixed	Portable/ ransportable
<b>10</b>	<b>Miscellaneous</b>		
<b>10.1</b>	Any form of heating not specified in the tables above.	<b>F</b>	<b>F</b>
<b>10.2</b>	Any form of heating not conforming to section 3 of this document.	<b>F</b>	<b>F</b>
<b>10.3</b>	Any heater or system using fuel of an unconventional nature which does not conform with RC4: Recommendations for space heaters burning waste fuel (ref 15).	<b>F</b>	<b>F</b>

## 11. Checklist

		Yes	No	N/A	Action required	Due date	Sign on completion
<b>11.1</b>	<b>Compliance with fire safety legislation (section 1)</b>						
11.1.1	Have the heating systems been considered at the time of the fire risk assessment undertaken for the business in compliance with the Regulatory Reform (Fire Safety) Order 2005 (or the equivalent legislation in Scotland and Northern Ireland)? (1.1)						
11.1.2	Where appropriate, has an assessment been made in compliance with the Dangerous Substances and Explosive Atmospheres Regulations 2002 (DSEAR)? (1.2)						
11.1.3	Has reference been made to the relevant fire and rescue service website to determine the level of response in the area in which the premises are located? (1.3)						
<b>11.2</b>	<b>Business continuity (section 2)</b>						
11.2.1	Was an appropriate heating system selected at the design stage and is it carefully maintained to ensure effective business operations? (2.1)						
11.2.2	Have steps been taken to ensure the continued smooth running of the business by making a suitable emergency plan addressing the implications of a fire, flood or other perceived disaster on all facets of the business model? (2.2)						
11.2.3	Has the emergency plan been rehearsed by means of a table top exercise, with the results being assessed and amendments made to the plan as necessary? (2.3)						
11.2.4	Has consideration been given to applying commercially available computer programmes to develop and check the adequacy of the plan? (2.4)						
<b>11.3</b>	<b>Fire safety management (section 3)</b>						
11.3.1	Are heaters used only with the type(s) of fuel for which they are designed? (3.1)						
11.3.2	Are all heaters used, maintained and serviced in compliance with the manufacturers' instructions? (3.2)						
11.3.3	Have electrical heaters not fitted with a 13 amp plug been installed by a competent electrician? (3.3)						
11.3.4	Are the wiring and the other elements of electrical installations in the premises tested periodically by a competent electrician and in accordance with the current edition of BS 7671 (the IET Wiring Regulations) with inspections being carried out on a risk assessed basis as recommended in the Periodic Inspection Report? (3.4)						
11.3.5	Where a portable heater is in use (ie one fitted with a 13 amp plug), is it inspected periodically (PAT tested) at least in accordance with HS(G)107 and the IET Code of Practice for In-service Inspection and Testing of Electrical Equipment? (3.5)						

		Yes	No	N/A	Action required	Due date	Sign on completion
11.3.6	Are gas heaters installed, serviced and maintained in accordance with the manufacturer's instructions by a Gas Safe registered engineer? (3.6)						
11.3.7	Are oil-fired boilers serviced at least annually in accordance with the manufacturer's requirements by an OFTEC Registered Technician? (3.7)						
11.3.8	Has special consideration been given to heaters burning fuel of an unconventional nature? (3.8)						
11.3.9	Are solid fuel appliances serviced and maintained by a competent engineer in accordance with the manufacturer's requirements? (3.9)						
11.3.10	When portable heaters are not in use are they stored in a low fire risk area, with gas cylinders removed or fuel tanks emptied?						
11.3.11	Is the area within 1m of all heaters and boilers identified by means of barriers and/ or prominent floor markings and kept free of combustible material? (Where there are dedicated boiler rooms are these free of combustible materials and not used for drying clothes?) (3.10)						
11.3.12	Are air circulation ducts, grilles and lagging components that form part of the heating system of non-combustible construction? (3.11)						
11.3.13	Is the installation of flues in accordance with the requirements of Approved Document J to the Building Regulations 2000? (3.12)						
11.3.14	Are flues as short as practicable, leading directly to the open where possible and not passing through fire compartment walls, being contained within floor or ceiling voids or roof spaces where exposed combustible materials are present? (3.13)						
11.3.15	In those cases where it is not possible to install the flue as indicated in paragraph 3.13, is it enclosed in a service shaft of non-combustible construction having a fire resistance of at least 30 minutes and with sufficient access points to facilitate cleaning of the flue throughout its length? (3.14)						
11.3.16	Where a flue penetrates a combustible element of a roof or ceiling has the following been considered: a) an insulating and non-combustible collar fitted around the pipe with a minimum thickness of 40mm; b) a proprietary sleeve system installed around the pipe with at least 60-minutes' fire resistance in terms of insulation and integrity; or c) the combustible material being cut back leaving a space of at least 150mm around the flue pipe? (3.15)						
11.3.17	Are all parts of flue pipes accessible to allow regular cleaning to prevent the build-up of tar, soot and other deposits? (3.17).						

		Yes	No	N/A	Action required	Due date	Sign on completion
11.3.18	Does the frequency of cleaning depend upon the rate of build-up of the deposits, which is monitored? (3.17)						
11.3.19	Are chimneys carried to such height and position as will ensure freedom from downdraught, and are they of suitable construction with access for cleaning the whole length of the flue? (3.18)						
11.3.20	Has consideration been given to the provision of spark arrestors in chimneys in appropriate circumstances? (3.19)						
11.3.21	Does each item of oil-burning equipment have a separate flue which is not connected to the same chimney as flues from heaters burning solid fuel? (3.20)						
11.3.22	Are portable heaters used in accordance with RC15: <b>Recommendations for the use of portable and transportable heaters in commercial and industrial premises?</b> (3.21)						
11.3.23	Has any method of heating for use in potentially flammable and/or explosive atmospheres been given special consideration following a risk assessment of the area in accordance with the DSEAR Regulations? (3.22)						
<b>11.4</b>	<b>Fire protection (section 4)</b>						
11.4.1	Is a suitable number of appropriate portable fire extinguishers available in the immediate vicinity of boilers and other heating appliances and are these immediately accessible in the case of a fire? (4.1)						
11.4.2	Are portable extinguishers approved and certificated by an independent, third party certification body, installed in accordance with BS 5306-8 and inspected and maintained in compliance with BS 5306-3? (4.1)						
11.4.3	Are extinguishers prominently signed and is a weekly inspection of all fire points carried out to ensure that they are in place, undamaged and readily accessible? (4.2)						
<b>11.5</b>	<b>Classification (section 5)</b>						
11.5.1	When designing or refurbishing properties is consideration given to reducing the risk of fire by selecting a heater or heating system with as low a classification as practicable?						

## ➤ REFERENCES

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